Appendix: Anchoring of inflation expectations: has past progress paid off?

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A model to assess the anchoring of inflation expectations

This appendix describes the model we build to quantify the three properties of well anchored inflation expectations. Compared with the literature where the focus is either on a single property (such as the sensitivity of expectations to inflation) or each property is quantified separately, our approach allows for a joint quantification of all three properties within a single framework.

We build a vector auto-regression (VAR) model of the joint dynamics of CPI inflation (π), short-term expectations (π^{e1}, STE, 12-month horizon) and long-term expectations (π^{eh}, LTE, six to 10 years out). The vector of α's denotes the constant terms, the B matrix denotes the auto-regressive relationships between the endogenous variables, and the vector of u's denotes the "structural shocks", which by design are orthogonal. The C matrix captures our identifying assumptions, ie shocks to STEs (eg a VAT increase announcement that comes into force in a couple of years) or LTEs (eg a change in government that is more likely to impinge on central bank independence or credibility in the longer term) do not affect inflation contemporaneously, and that shocks to LTE do not affect STE contemporaneously.

$$\begin{bmatrix} \pi_t \\ \pi_t^{e1} \\ \pi_t^{eh} \end{bmatrix} = \begin{bmatrix} \alpha \\ \alpha^{e1} \\ \alpha^{eh} \end{bmatrix} + \underbrace{\begin{bmatrix} \beta & \gamma & \delta \\ \beta^{e1} & \gamma^{e1} & \delta^{e1} \\ \beta^{eh} & \gamma^{eh} & \delta^{eh} \end{bmatrix}}_{B} \begin{bmatrix} \pi_{t-1} \\ \pi_{t-1}^{e1} \\ \pi_{t-1}^{eh} \end{bmatrix} + \underbrace{\begin{bmatrix} c_{11} & 0 & 0 \\ c_{21} & c_{22} & 0 \\ c_{31} & c_{32} & c_{33} \end{bmatrix}}_{C} \begin{bmatrix} u_t \\ u_t^{e1} \\ u_t^{eh} \end{bmatrix}$$

We estimate the model for each country in our sample using semiannual data over a 15-year window. As our measure of inflation expectations, we use forecasts of inflation provided by Consensus Economics. Our data cover close to 40 AEs and EMEs. For most economies, data go back to April 1996, and the latest observation is for January 2022. Hence, the earliest estimation window is April 1996 to October 2010. The availability of a long time series lets us fit a series of models on a sliding window of 15 years, and thus obtain a time varying measurement of the degree of anchoring per economy.

Turning to the quantification of the three properties of well anchored expectations, we begin by noting that the forecast error variance (FEV ie the variability of the difference between the model-based projection of LTE and the actual outcome) of π^{eh} at a two-year horizon (which is about when the projections generally stabilise in our model) reflects the stability of LTEs. Intuitively, this metric measures the volatility of LTE that is not captured by the estimated joint dynamics of the three variables.

Next, to gauge where the expectations are anchored, we examine the absolute value of the distance between the model-implied steady state value of π^{eh} and the (mid-point of the) inflation target (range). For non-inflation targeting central banks, we use the long-run average of long-term expectations as a reference point. Intuitively, this metric abstracts away from the short-lived deviations of LTEs from the target and instead assesses whether LTEs would gravitate towards the target in the long run.

Finally, the forecast error variance decomposition (FEVD) of π^{eh} at a two-year horizon provides the fraction of variability in π^{eh} that is explained by shocks to inflation, u, as opposed to its own shocks, u^{eh}, or shocks to STEs, u^{e1}. Intuitively, if LTEs respond to recent inflation gyrations (ie contribution of inflation shocks is high), it is a sign that expectations are probably unanchored.